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EVALUATION OF A METHOD FOR TRABECULAR MESHWORK PERFUSION OF HALF ANTERIOR SEGMENTS OF THE HUMAN EYE. B.G. Dijkstra, P.F. Hoyng. Department of Experimental Ophthalmology, The Netherlands Ophthalmic Research Institute, Amsterdam, The Netherlands.

Purpose. Anterior segment perfusion provides a tool for determining flow in the trabecular outflow pathway only, contrary to perfusion of whole eyes in which 10-30% of the outflow comes on account of the uveoscleral pathway. Since disposed human eyes are not abundantly available, especially not as a pair, it would be convenient to develop a model in which one half of an anterior segment could serve as a control for the other, drug treated half. It would also be of great advantage in blocker studies. In this study we report a new method to determine flow in half anterior segments.
Method. A chamber was developed to handle half anterior segments. The chamber provides a maximum fit and a minimum of stress on the shape of the essential structures. Several parameters were evaluated to compare whole - with half segments. Also some drugs were applied. Real time flow data were collected for later analysis
Results. It is possible to divide anterior segments for flow measurement. Some flow is lost due to clamping. Flow seems to be unequally distributed through the meshwork, indicating areas of preferential flow. Drug effects were established in the presence of a control.
Conclusion. Perfusion of half segments offer a new perspective to the study of the trabecular meshwork. More investigations will be done in order to further establish the usefulness and applicability of this technique.

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THE TRABECULAR MESHWORK: LESSONS FROM ELECTROPHYSIOLOGICAL AND CONTRACTILITY MEASUREMENTS

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Purpose This review will present evidence for contractile properties of the trabecular meshwork (TM).
Methods Membrane voltage measurements and patch-clamp techniques were applied in cultured bovine and human TM and ciliary muscle (CM) cells. Measurements of isometric tension were performed on isolated TM (and CM) strips. Anterior segments of bovine eyes with well preserved TM were perfused to measure outflow rate.
Results (1) Cultured bovine and human TM cells showed voltage spikes typical for smooth muscle cells which were inhibited by nifedipine, but insensitive to tetrodotoxine. The excitability of TM cells indicates that they function as contractile smooth muscle cells. There is no principle difference between human and bovine TM cells concerning K^+- and Ca^{2+}-channels, functional receptors for endothelin and effects of cholinergic and adrenergic agonists. (2) Direct measurements of contractility of isolated strips indicate the presence of muscarinic (M_3), α- and β-adrenergic and endothelin receptors in the bovine TM (and CM). Cholinergic and α-adrenergic (mainly α_2) agonists produced contraction while β-agonists produced relaxation. Relaxation was induced by release of nitric oxide. The contractile properties of TM and CM are differently modulated by the various drugs. (3) Substances which produced contraction in TM strips induced a decrease of outflow rate of the anterior segment. Relaxing substances induced an increase of outflow rate.
Conclusions The trabecular meshwork per se is a contractile element and is, at least in the bovine eye, directly involved in the regulation of aqueous humor outflow. The concept of functional antagonism between TM and CM has to be considered in the interpretation of mechanism of action of currently used antiglaucoma drugs and the search for new effective drugs.

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TITLE: AGE RELATED CHANGES ON THE POSTERIOR IRIS SURFACE: A POSSIBLE RELATION TO THE PATHOGENESIS OF EXFOLIATION.

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Purpose: To look for possible age related changes in the posterior surface of the human iris.

Methods: An electron microscopic study was performed on 9 human iris samples taken from clinically normal irides belonging to different age groups ; 1 day postnatal, 3 months, 3 years, 9 years, 27 years, 52 years, 59 years (2 patients) and 65 years of age.

RESULTS: Some aging changes could be defined, namely; duplication of the basal lamina of the posterior iris pigment epithelial cells, formation of atrophic invaginations in the posterior cell membranes containing branching interlacing basal lamina, formation (or deposition) of microfibrils 11 nm in diameter, with a banding periodicity of 16 nm, deposition of electron dense granules in relation to the basal lamina and/or microfibrils and the presence of some fine granular material overlying the basal lamina.

CONCLUSION: These changes have been consistently described in association with exfoliation material. The possibility of exfoliation being an eventual aging change is suggested.

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A LECTIN HISTOCHEMICAL ANALYSIS OF EYES WITH EXFOLIATION SYNDROME AND CAPSULAR GLAUCOMA

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Purpose To clarify the origin of intraocular exfoliation material and the usefulness of lectin histochemistry in localizing it by comparing the lectin-binding profiles of various tissues in eyes with and without exfoliation syndrome and capsular glaucoma with that of exfoliation material.
Methods 13 formalin-fixed, paraffin-embedded human eyes with exfoliation syndrome, with or without capsular glaucoma, and 11 control eyes were studied using a panel of 17 lectins. Stainings were done using the avidin-biotinylated peroxidase complex (ABC) method with both pepsin and neuraminidase pretreatments.
Results The glycoconjugate composition of exfoliation material is complex. The α-mannose-specific concanavalin A (ConA) and *Lens culinaris* (LCA), the Gal(β1→3)GalNAc-reactive lectins *Bauhinia purpurea alba* agglutinin (BPA) and peanut agglutinin (PNA), as well as the Gal(β1→4)GlcNAc-reactive lectins Phaseolus vulgaris erythroagglutinin (PHA-E) and *Ricinus communis* agglutinin (RCA-I) gave the strongest label with exfoliation material. In comparing the lectin binding pattern of exfoliation material with that of neighbouring tissues, very similar reactions were detected in the non-pigmented ciliary epithelium. Binding to the zonular fibres and lamella, as well as to the subendothelial region of the iris blood vessels resembled the lectin binding to exfoliation material to a significant extent. The lens capsule was essentially unstained with all the lectins used, whereas lectin binding to the lens epithelium resembled that of exfoliation material.
Conclusions The results suggest that exfoliation material may be produced by the non-pigmented ciliary epithelium, while it remains to be shown whether the zonular fibers, zonular lamella, iris, or lens epithelium paly any role as sources of exfoliation fibres. The lectins mentioned above are useful tools in localizing exfoliation material in human eyes.